ABSTRACT

An improved half-pin lag screw implant for external fixator constructs in which two or more bone fragments can be compressed together by lag screw principle, in which the implant can be driven at right angles to the fracture surfaces with or without a guide wire technique, to yield maximum mechanical compression at right angles to the fracture plane, in which the implant can be driven at any required angle to the outer bone surface other than a right angle, with an intercalated spherical head for that purpose which will exert concentric pressure over a matching countersunk area in the bone surface, thus preventing micro-fractures of bone surface and loosening, brought about by localization of stress on bone beyond its mechanical tolerance. The same implant exerting lag screw effect by means of a thread at the leading tip engaging only a single bone fragment near its tip, and a smooth shaft section extending to the intercalated spherical head, which allows the second and any intervening fragments to slide over the smooth shaft, with the head pressing on the outermost fragment, as the device is turned home. The outer end serves as a drive shaft for turning the screw, as well as for participation in an external fixator construct through connecting clamps, and also for renewal of any compression torque lost over time. Also an improved Basic external fixation implant for gripping a single bone fragment with a hollow conical or dome shaped head with an open base, with apex or convexity towards the outer end of the implant, a blunt rim of the hollow head resting upon the bone surface, making interrupted contact by a margin that is undulated or beaded, which allows nutrition to reach under the hollow head to generate a ring of new bone at the margin of the drill hole, to reinforce the strength of the bone on removal of implant. Triple stabilizing factors being a radial pre-load by driving implant through a

smaller drill hole, a surface pre-load of head which transmits lateral bending stresses from drive shaft through head to surface of bone instead of to the drill hole margins, and an axial pre-load tensioning the implant against the female thread in bone. The triple mechanism distributes stresses widely a three implant/bone interfaces to reduce tendency for loosening at drill hole/shaft interface. The surface and axial pre-loads are renewable by further subsequent turning in. The basic implant being fully threaded from leading tip to intercalated head, avails of maximum contact with bone thread for wide stress distribution; and the head being integral to rod, rules out any cyclic micro motion between implant components. In the interest of implant strength, the basic implant is of a solid cross-section. In the interest of ideal angle to the fracture plane, the lag screw implant of canalized variety allows a guide wire technique. The lag screw implant also has the option of a mobile head, which is fixable to rod at desired level, to reduce inventory.

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